

Metal Water Quality Standards - Rio Grande Stream Segment 9 (Colorado Water Quality Regulation 36, accessed 1

Parameter	Standard	Units	Fraction
pH	6.5 to 9	S.U.	
As (ac)	340	µg/L	Dissolved
As (ch)	0.02	µg/L	Total Recoverable
Cd (ac)	TVS (tr)	µg/L	Dissolved
Cd (ch)	TVS	µg/L	Dissolved
Cr(III) (ch)		50 µg/L	Total Recoverable
Cr(VI) (ac)	TVS	µg/L	Dissolved
Cr(VI) (ch)	TVS	µg/L	Dissolved
Cu (ac)	TVS	µg/L	Dissolved
Cu (ch)	TVS	µg/L	Dissolved
Fe (ch)		1000 µg/L	Total Recoverable
Fe(ch)	WS	ug/L	Dissolved Water Supply, see below
Pb (ac)	TVS	µg/L	Dissolved
Pb (ch)	TVS	µg/L	Dissolved
Mn (ac)	TVS	µg/L	Dissolved
Mn (ch)	TVS	µg/L	Dissolved
Mn (ch)	WS	ug/L	Dissolved Water Supply, see below
Hg (ch)		0.01 µg/L	Total
Ni (ac)	TVS	µg/L	Dissolved
Ni (ch)	TVS	µg/L	Dissolved
Se (ac)	TVS	µg/L	Dissolved
Se (ch)	TVS	µg/L	Dissolved
Ag (ac)	TVS	µg/L	Dissolved
Ag (ch)	TVS (tr)	µg/L	Dissolved
Zn (ac)	TVS	µg/L	Dissolved
Zn (ch)	TVS	µg/L	Dissolved

TVS Calculations					
Analyte	Formula				Hardness
Ag (ac)	$0.5 * e^{(1.72 * \ln(\text{hardness}) - 6.52)}$				50
Ag (ch) (trout)	$0.5 * e^{(1.72 * \ln(\text{hardness}) - 6.52)}$				50
Al (ac)** (TRec)	$e^{(1.3695 * \ln(\text{hardness}) + 1.8308)}$				
Al (ch)** (TRec)	$e^{(1.3695 * \ln(\text{hardness}) - 0.1158)}$				
As (ac)	340				
As (ch)	150				
Cd (ac)	$(1.136672 - [(\ln \text{hardness}) * (0.041838)]) * e^{(0.9151 * \ln \text{hardness}) - 3.1485}$				50
Cd (ac) (trout)	$(1.136672 - [(\ln \text{hardness}) * (0.041838)]) * e^{(0.9151 * \ln \text{hardness}) - 3.6236}$				50
Cd (ch)	$(1.101672 - [(\ln \text{hardness}) * (0.041838)]) * e^{(0.7998 * \ln \text{hardness}) - 4.4451}$				50
Cr III					
Cu (ac)	$e^{(0.9422 * \ln \text{hardness}) - 1.7408}$				50

Cu (ch)	$e^{(.8545[\ln \text{hardness}] - 1.7428)}$				50
Fe (ch)** (TRec)	1000				
Pb (ac)	$(1.46203 - [(\ln \text{hardness}) * 0.145712]) * e^{(1.273[\ln \text{hardness}] - 1.46)}$				50
Pb (ch)	$(1.46203 - [(\ln \text{hardness}) * 0.145712]) * e^{(1.273[\ln \text{hardness}] - 4.705)}$				50
Mn (ac)	$e^{(0.3331 * \ln(\text{hardness}) + 6.4676)}$				50
Mn(ch)	$e^{(0.3331 * \ln(\text{hardness}) + 5.8743)}$				50
Ni (ac)	$e^{(0.846 * \ln(\text{hardness}) + 2.253)}$				50
Ni (ch)	$e^{(0.846 * \ln(\text{hardness}) + 0.0554)}$				50
Zn (ac)	$0.978 * e^{(0.9094[\ln \text{hardness}] + 0.9095)}$				50
Zn (Ch)	$0.986 * e^{(0.9094[\ln \text{hardness}] + 0.6235)}$				50

Water Supply Standards - New

As	0.02 - 10				
Cd	5	1 day			
Cu	1000				
Fe	300 dissolved	30 day			
Pb	50	1 day			
Mn	50	30 day			
Zn	5000	30 day			

Cr(III) (ac)					50
Cr(III) (ch)					50

0/2012)

Concentration (µg/L)	Hardness	Concentration (µg/L)	Hardness	Concentration (µg/L)	Hardness
0.62	100	2.03	200	6.69	400
0.023	100	0.075	200	0.247	400
1.5	100	2.7	200	5.0	400
0.93	100	1.7	200	3.11	400
0.25	100	0.424	200	0.72	400
7.0	100	13.4	200	25.8	400

5.0	100	9.0	200	16.2	400
30	100	65	200	136	400
1.2	100	2.5	200	5.3	400
2370	100	2986	200	3761	400
1309	100	1650	200	2078	400
260	100	468	200	842	400
29	100	52	200	93	400
85	100	160	200	301	400
65	100	121	200	228	400

323	100	570	200	1005	400
42	100	74	200	131	400

Concentration ($\mu\text{g/L}$)
22.02
0.815
9.1
5.69
1.20
49.6

29.3
281
10.9
4738
2618
1513
168
564
428

1773
231

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As (ch)	0.02 µg/L		Total Recoverable
Cd (ac)	TVS (tr)	µg/L	Dissolved
Cd (ch)	TVS	µg/L	Dissolved
CrIII (ac)		50 µg/L	Total Recoverable
CrIII (ch)	TVS	µg/L	Dissolved
CrVI (ac)		16 µg/L	Dissolved
CrVI (ch)		11 µg/L	Dissolved
Cu (ac)	TVS	µg/L	Dissolved
Cu (ch)	TVS	µg/L	Dissolved
Fe (ch)		1000 µg/L	Total Recoverable
Fe(ch)	WS	ug/L	Dissolved Water Supply, see below
Pb (ac)	TVS	µg/L	Dissolved
Pb (ch)	TVS	µg/L	Dissolved
Mn (ac)	TVS	µg/L	Dissolved
Mn (ch)	TVS	µg/L	Dissolved
Mn (ch)	WS	µg/L	Dissolved Water Supply, see below
Mo (ch)		160 µg/L	Total Recoverable
Hg (ch)		0.01 µg/L	Total
Ni (ac)	TVS	µg/L	Dissolved
Ni (ch)	TVS	µg/L	Dissolved
Se (ac)		18.4 µg/L	Dissolved
Se (ch)		4.6 µg/L	Dissolved
Ag (ac)	TVS	µg/L	Dissolved
Ag (ch)	TVS	µg/L	Dissolved
Zn (ac)	TVS	µg/L	Dissolved
Zn (ch)	TVS	µg/L	Dissolved

TVS Calculations				
Analyte	Formula			Hardness
Ag (ac)	$0.5 * e^{(1.72 * \ln(\text{hardness}) - 6.52)}$			50
Ag (ch) (trout)	$0.5 * e^{(1.72 * \ln(\text{hardness}) - 6.52)}$			50
Cd (ac)	$(1.136672 - [(\ln \text{hardness}) * (0.041838)]) * e^{(0.9151 * \ln \text{hardness}) - 3.1485}$			50
Cd (ac) (trout)	$(1.136672 - [(\ln \text{hardness}) * (0.041838)]) * e^{(0.9151 * \ln \text{hardness}) - 3.6236}$			50
Cd (ch)	$(1.101672 - [(\ln \text{hardness}) * (0.041838)]) * e^{(0.7998 * \ln \text{hardness}) - 4.4451}$			50
Cr III (ch)	$e^{(0.819 * \ln \text{hardness}) + 0.5340}$			50
Cu (ac)	$e^{(.9422 * \ln \text{hardness}) - 1.7408}$			50
Cu (ch)	$e^{(.8545 * \ln \text{hardness}) - 1.7428}$			50
Fe (ch)** (TRec)	1000			
Pb (ac)	$(1.46203 - [(\ln \text{hardness}) * 0.145712]) * e^{(1.273 * \ln \text{hardness}) - 1.46}$			50
Pb (ch)	$(1.46203 - [(\ln \text{hardness}) * 0.145712]) * e^{(1.273 * \ln \text{hardness}) - 4.705}$			50
Mn (ac)	$e^{(0.3331 * \ln(\text{hardness}) + 6.4676)}$			50

Mn(ch)	$e^{(0.3331 * \ln(\text{hardness}) + 5.8743)}$				50
Ni (ac)	$e^{(0.846 * \ln(\text{hardness}) + 2.253)}$				50
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Zn (ac)	$0.978 * e^{(0.9094[\ln \text{ hardness}] + 0.9095)}$				50
Zn (Ch)	$0.986 * e^{(0.9094[\ln \text{ hardness}] + 0.6235)}$				50

Water Supply Standards - New

As 0.02 - 10

Cd 5 1 day

Cu 1000

Fe 300 dissolved 30 day

Pb 50 1 day

Mn 50 30 day

Zn 5000 30 day

Cr(III) (ac)					50
Cr(III) (ch)					50

0/2012)

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